

UNDERGARMENT TO BE WORN BY A FEMALE

FIELD OF THE INVENTION

[0001] This invention relates to undergarments to be worn by a female, including panties, thongs, and pantyhose.

BACKGROUND OF THE INVENTION

[0002] Most women will experience a vaginal infection at least once in their lives. In the United States, women seek medical help for vaginal infections more than 10,000,000 times a year. For adult women, vaginal infections are the most common reason these women seek medical attention. These vaginal infections can be accompanied by a variety of symptoms, including: abdominal discharge, order, itching, burning, and pain or irritation with intercourse or urination. The three most common vaginal infections are bacterial vaginosis, candidiasis and trichomoniasis. If left untreated, bacterial vaginosis may cause complications. In pregnancy, bacterial vaginosis has been associated with premature birth and low-birth-weight infants. There may also be a risk of trinecologic complications. Bacterial vaginosis has been associated with abnormal Pap smear results, including inflammation and other cervical changes. Women with bacterial vaginosis may have increased risk of developing pelvic inflammation disease, a complication that can require hospitalization. Complications associated with pelvic inflammation disease include infertility, pelvic pain and ectopic (or tubal) pregnancy. Untreated bacterial vaginosis has also been associated with some increased risk of sexually transmitted diseases and infections following gynecologic surgery.

[0003] Many doctors recommend wearing white cotton panties either to avoid vaginal infections or while vaginal infections are being treated. However, many women believe that white cotton panties are not as attractive, or comfortable, as synthetic “silky” style panties. Furthermore, many women believe that synthetic “silky” style panties look better, feel better, and wear better under pants and skirts, and tend to allow the overgarments to move relative to the panties. In contrast, overgarments tend to cling to cotton panties and do not look as attractive.

[0004] It is known to provide a synthetic “silky” style panty with a cotton crotch liner. These cotton crotch liners do remove some amount of moisture from the vaginal area of the wearer. However, the cotton liners are covered with the synthetic “silky” fabric which has relatively much smaller openings between threads and therefore does not allow for sufficient air to pass through the fabric to dry out the crotch area of the wearer.

[0005] A variety of undergarments with different crotch constructions and materials are known. Faust, U.S. patent number 4,009,495, discloses a women's stretch panty made of stretchable nylon, or similar synthetic material to provide to a stretchable basic garment. A crotch portion is provided intricately knit of cotton thread. Because of the comfort and breathability of cotton, but more importantly, the openings or mesh in the cotton knit are considerably greater than those of the stretch yarn forming the body portion. The cotton crotch portion has a mesh opening of at least ten times more (larger) than the mesh opening of a knit plastic body portion. Furthermore, the large mesh or open knit cotton of the crotch portion has no appreciable stretchability. However, Faust maintains that this is not a serious disadvantage

since the area of the large mesh cotton crotch is only a small portion of the total area of the panty.

[0006] Hancock, U.S. patent number 6,209,143, discloses a highly ventilated crotch panel in a pair of pantyhose. The crotch panel in one embodiment may have a single aperture extending completely through the main body portion of the crotch panel. The edges of the aperture are trimmed with elastic lace. The main body portion of the crotch panel may comprise a single layer of stretchable knit cotton, or other material, which is preferably moisture absorbent. The diameter of the aperture, which is circular, is approximately one half the total width of the body portion of the crotch panel. In another embodiment, the crotch panel has a plurality of circular apertures, each having a diameter which is roughly one quarter of the width of the main body portion of the crotch panel. Although the Hancock embodiments certainly do provide ventilation, many women find such garments undesirable because the apertures would make their genital region visibly exposed.

[0007] Burleson, U.S. patent number 3,566,624, discloses a pantyhose with a loosened stitch crotch area. The pantyhose is knitted from a single fabric and includes a crotch portion wherein in the stitches are loosened approximately 100 percent in comparison with the stitches in the remainder of the pantyhose. The openings in the crotch portion are clearly visible to the unassisted human eye, as shown in the drawings.

[0008] Gaitati, U.S. patent number 3,815,156, discloses a pantyhose garment constructed of a knitted fabric and incorporating stocking tubes, each having a foot, leg and upper portion with the upper portion being joined together along the center seam thus defining the panty portion of the pantyhose garment. The crotch area of the pantyhose garment is provided with an insert of knit material having larger interstices designing air passages in the knitted material forming the remainder of the pantyhose garment thereby providing effective ventilation of the portion of the body of the wearer covered by the crotch insert. The insert of the crotch portion is constructed of knitted multiple strand elastic yarn. However, no details are taught with respect to the relative size of the openings of the crotch portion.

[0009] Pyatt et al., U.S. patent number 6,074,274, discloses an undergarment for eliminating panty lines and panty bulges while wearing shorts or skirts. The undergarment is made from a bio-component nylon comprising a mixture of spandex and nylon or elastic rubber and nylon. A crotch region has a cotton layer on an inner surface. The cotton layer provides for similar function as panties such that the undergarment may be worn instead of panties, thereby eliminating the need to wear panties and consequently panty lines. The undergarment includes a torso portion 20 and a leg portion 30 comprising elastic nylon to permit greater ventilation of air to skin than that provided by panties. Figure 1 of the reference illustrates a side view of the garment showing the same material on the outside covering the entire undergarment, including the crotch portion 28. Figures 3 and 4 are top views of the undergarment illustrating a cotton layer on the inner surface of the undergarment.

[00010] Garrou et al., U.S. patent number 3,909,851, discloses a pantyhose with a terry loop crotch insert. The pantyhose garment is formed of a pair of seamless hosiery blanks which are longitudinally split and seamed together with an insert secured between the edges of the hosiery blanks and positioned in at least the crotch portion of the panty of the garment. The crotch insert includes a stretchable synthetic body yarn which is of the same character as the yarn of the adjacent portion of the pantyhose so that the finished appearance of the insert is substantially the same as the adjacent portion of the pantyhose. Terry loops of yarn having a higher moisture absorbent character are formed on the inner surface of the crotch insert to provide softness and absorbency in the crotch of the pantyhose. The body yarn of the insert may be a 40 denier stretchable synthetic yarn. The insert is also provided with the terry loops which extend inwardly from the interface of the insert and may be formed of cotton yarn.

SUMMARY OF THE INVENTION

[00011] One embodiment of the invention includes an undergarment for wear by a female comprising: a front panel constructed and arranged to cover at least a portion of the abdomen of the wearer of the undergarment, the front panel comprising a plurality of first threads comprising a synthetic material, the first threads being formed in a repeating pattern to provide an opening between threads; a second panel constructed and arranged to cover at least a portion of the crotch area of the wearer, the second panel comprising a plurality of second threads comprising cotton, the second threads being formed in a repeating pattern to provide an opening between threads of each pattern, the average area of the openings of the second panel being 2-9 times larger than the average area of the openings of the front panel, the second panel being attached to

the front panel, the pattern of the second threads in the second panel being substantially consistent throughout the second panel.

BRIEF DESCRIPTION OF THE DRAWINGS

[00012] Figure 1 illustrates one embodiment of an undergarment to be worn by a female according to the present invention.

[00013] Figure 2 illustrates another embodiment of an undergarment to be worn by a female according to the present invention.

[00014] Figure 3 illustrates another embodiment of an undergarment to be worn by a female according to the present invention.

[00015] Figure 4 illustrates another embodiment of an undergarment to be worn by a female according to the present invention.

[00016] Figure 5 illustrates one arrangement of panels of an undergarment to be worn by a female according to one embodiment of the invention.

[00017] Figure 6 illustrates another arrangement of panels of an undergarment to be worn by a female according to one embodiment of the invention.

[00018] Figure 7 illustrates another arrangement of panels of an undergarment to be worn by a female according to the present invention.

[00019] Figure 8 illustrates one embodiment of threads, and an opening between threads in a panel of an undergarment to be worn by a female according to the present invention.

BRIEF DESCRIPTION OF PREFERRED EMBODIMENTS

[00020] Figure 1 illustrates one embodiment of an undergarment to be worn by a female according to the present invention and includes a front panel 12 constructed and arranged to cover at least a portion of the abdomen of the female wearer of the undergarment. A second panel 14 is secured to the front panel 12 and is constructed and arranged to cover at least a portion of the crotch area of the wearer of the undergarment. The area of the crotch covered by the second panel 14 may vary with different embodiments but at least covers the vaginal opening area of the wearer. In another embodiment the second panel 14 covers at least the vaginal opening of the wearer and extends to and covers the urethra. In another embodiment the second panel 14 covers at least the area of the vaginal opening and extends to and covers the area of the mons pubis. In another embodiment the second panel 14 covers the area of the anus and extends to and covers at least the mons pubis. The second panel 14 may be varied to cover any of the above-recited areas of the crotch region of the wearer.

[00021] In the undergarment embodiment shown on Figure 1, back panel 26 is connected to the second panel 14 and a waistband 16 is provided connecting the upper edge of the front panel 12 and the back panel 26 to provide a top opening 18. Leg openings 20 and 22 are provided in the undergarment and an elastic trim 24 may be secured to an edge of the front and back panels 12, 26 and the second panel 14 to define the leg openings 20 and 22. The leg openings 20 and 22 are formed in the undergarment shown in Figure 1 so that the undergarment does not cover the thigh of the wearer. In one embodiment the second panel 14 is secured to the front panel 12 and the back panel 26 using stitching 15 using thread in a manner known to those skilled in the art.

[00022] Figure 2 illustrates another embodiment of an undergarment 10 to be worn by a female according to the present invention which also includes the front panel 12 and second panel 16 secured thereto preferably by stitching 15 and to a back panel 26. The waistband 16 is attached to the upper edge of the front panel 12 and back panel 16 to define a top opening 18. Although leg openings 20 and 22 are provided in the undergarment 10, a thigh portion 28 is provided covering at least a portion of the thigh.

[00023] Figure 3 illustrates another embodiment of an undergarment according to the present invention in the form commonly known as a thong panty 10. The thong panty 10 includes the front panel 12 constructed and arranged to cover at least a portion of the abdomen of the wearer and the second panel 14 to cover at least a portion of the crotch area of the wearer. Stitching 15 is provided to secure the second panel 14 to the front panel 12. Optionally the elastic trim 24 is provided along the edges of the front panel 12 and second panel 14 to define leg

openings 20 and 22 similar to the leg openings shown in Figure 1. The thong panty 10 shown in Figure 3 includes a rear portion 29 (for covering at least a portion of the rear of the wearer) which includes a thin strap or band portion 30 constructed and arranged to be received between the buttocks (gluteus maximus) muscles of the wearer. Optionally, a flared portion 31 may be attached to the thin strap or band 30 and also connected to a waistband 16.

[00024] Figure 4 illustrates a pantyhose 10 as another embodiment of an undergarment for wear by a female, according to the present invention. The pantyhose 10 is similar to that described with respect to the undergarment shown in Figure 2 but additionally includes a lower leg portion 32 and a foot portion 34.

[00025] Figure 5 illustrates one embodiment of the orientation of panels in an undergarment according to the present invention. In this embodiment, the front panel 12 may have a front face 36 and a rear face 38 and the second panel 14 may be secured to the rear face 38 or the front face 36 of the front panel 12.

[00026] Figure 6 illustrates another embodiment of the orientation of panels in an undergarment to be worn by a female according to the present invention. In this embodiment, the crotch portion may include the second panel 14 and a third panel 14'. The third panel 14' may be constructed substantially the same as the second panel 14. The second panel 14 and the third panel 14' may be positioned to straddle the front panel 12 by attaching the second panel 14 to either the front face 36 or rear face 38 of the front panel 12 and attaching the third panel 14' to the other of the front face 36 or rear face 38 of the front panel 12.

[00027] Figure 7 illustrates another arrangement of panels in an undergarment according to the present invention. In this embodiment, the crotch portion may be included the second panel 14 secured to the front face 36 or rear face 38 of the front panel 12 and the third panel 14' may be attached to the second panel 14.

[00028] The front panel 12, second panel 14, third panel 14' and back panel 26 are made from fabrics under any method known to those skilled in the art, including for example, but not limited to, weaving or knitting threads together in a repeating pattern, each pattern defining an opening between adjacent threads. As shown in Figure 8, one embodiment may include woven threads having a first set of threads 40 generally running in one direction and a second set of threads 42 generally running in a second direction which may be perpendicular to the first direction. An opening 44 is provided between the adjacent pairs of threads 40 and 42. The front panel 12 may include a plurality of first threads. The second panel 14 may include a plurality of second threads. The back panel 26 may include a plurality of third threads. The front panel 12 and the back panel 26 may be made from any synthetic, man made thread, including, but not limited to, nylon, lycra, acrylic, or polyester based threads; or the panels 12, 26 may be made for a nature material such as silk or other similar material to provide a silky to the touch feel. The threads of the second panel 14 may include cotton. However, the openings 44 between threads of the fabric of the front panel 12 and the back panel 26 are substantially smaller than the openings 44 between the threads of the second panel 14. In a preferred embodiment, the threads of the second panel 14 consist essentially of cotton. In one embodiment, the average area of the openings between the threads of the second panel 14 range from 2-9 times larger than the

average area of the openings between the threads of the front panel 12. In another embodiment, the average area of the openings between the threads of the second panel 14 are 3-8 times greater than the average area of the openings between the threads of the second panel 12. In another embodiment, the average area of the openings between the threads of the second panel 14 are 3-6 times greater than the average area of the openings between the threads and the front panel 12. For example, the c area of the opening 44 between the threads of the second panel 14 may be on average 100 micrometers squared, and the average area of the openings between threads of the front panel 12 may be 25 micrometers squared. In a preferred embodiment, the second panel 14 consists essentially of threads of cotton, and optionally the third panel 14' consists essentially of threads of cotton.

[00029] In one embodiment, the second panel 14 is not covered by another fabric material that has openings between threads that are less than the openings between threads of the second panel 14. In another embodiment, the undergarment does not include another fabric covering the second panel that has openings between threads that are less than 3 times smaller than the openings between threads of the second panel 14. In one embodiment no synthetic material covers a substantial portion of the second panel 14.

[00030] At least the front panel 12 and the back panel 26 (if present) of an undergarment, according to one embodiment the present invention, is constructed and arranged so that the weave or knit pattern of the threads is so tight that the front panel 12 and the back panel 26 have a “silky” smooth to the touch feel or characteristic. The “silky” smooth to the touch feel or

characteristic of the front panel 12 and the back panel 26 allow overgarments to move relatively freely and slide across both the front panel 12 and the back panel 26 of the undergarment.

[00031] The second panel 14 of the undergarment includes a weave or a knit pattern that is substantially consistent across the second panel 14. The size or area of the openings 44 between the threads of the second panel 14 does not vary substantially. For example, in one embodiment the second panel 14 does not include an opening 44, which is more than twice the average size or area of the openings for the entire second panel 14. In one embodiment, the second panel 14 has a weave or knit pattern which is substantially continuous across the second panel and is not interrupted to define an aperture through the second panel 14. In another embodiment of the invention, the second panel 14 does not include an aperture formed therethrough, such as that disclosed in U.S. Patent No. 6,209,143.

[00032] The second panel 14, in one embodiment, may have an air permeability ranging from 2-9 times the air permeability of the front panel 12. In another embodiment, the air permeability of the second panel 14 may range from 3-8 times the air permeability of the front panel 12. In another embodiment, the air permeability of the second panel 14 may range from 3-6 times greater than the air permeability of the front panel 12.

[00033] In one embodiment, the second panel 14 is constructed and arranged to provide increased air flow therethrough in comparison to either the front panel 12 or back panel 26 of the undergarment. The increase in air flow through the second panel 14 helps to prevent vaginal infections or helps the healing process for a wearer who has a vaginal infection. The second

panel 14 may comprise white cotton, or the second panel may be dyed a color or pattern matching that of the front panel 12 or the back panel 26.

[00034] In one embodiment of the invention, a women's panty was provided with a synthetic first panel 12, back panel 26, and a second panel 14 comprising cotton. The panty was examined under a 50x microscope with a measuring scale having a minimum scale division of 0.2 mm. The first panel 12 includes synthetic thread that measured about 0.1 mm, and included opening between threads that had a generally triangle like shaped. The height of the triangle shaped opening was about 0.12 mm and the base was about 0.1 mm. The area of each opening in the front panel 12 was about 0.006 mm^2 . The second panel 14 included cotton threads that were about 0.2 mm thick, and also included openings between threads that were generally triangle like shaped. The height of the triangle in the second panel 14 was about 0.3 mm and the base was about 0.2 mm. The area of each opening was about 0.03 mm^2 . As such, the openings in the second panel 14 were about 5 times larger than the openings in the front panel 12.